Black Ash Creek Flood Control – Phase III

Background

The Black Ash Creek Flood Control project was undertaken in three phases.

Phase 1: The replacement of the Highway 26 Bridge over Black Ash Creek - a project undertaken by the Ainley Group in 1996.

Phase 2: The channelization of Black Ash Creek from a point near the Collingwood Harbour, extending upstream under the Highway 26 Bridge for 1.4 kilometres - completed in the spring of 2004.

Phase 3: The continued channelization of Black Ash Creek upstream for another 2.5 kilometres - substantial completion reached in June of 2005.

Over the past decade in Ontario, substantial evidence has been collected regarding the impacts of urbanization on our ecosystems; with the most pressing problems being the increase in flooding, erosion problems and long-term effects on wildlife habitats. In response, a growing number of municipalities and regulatory agencies have implemented watershed management plans as an effective means of addressing these problems.

On a regular basis, during major storm events and spring runoffs, Black Ash Creek overtopped its banks and spilled in an eastward direction causing extensive shallow flooding in the Town of Collingwood. As early as the mid-70's, flood control studies were undertaken to address this problem. Initial designs to mitigate the flooding consisted of a combination of dykes and channelization.

Since the creek is the largest watercourse entering the harbour, the Black Ash Creek Rehabilitation project (channelization only) was initiated in 1992 as part of the Collingwood Harbour Remedial Action Plan. During the project planning phase, the potential impact on fish habitat from channelization was recognized as a significant issue. In response to these concerns, a 1995 Environmental Study report revised the approach to a channelization project. The original flood control project was redesigned as a channel only (below original ground) to incorporate fisheries concerns and devise a plan to effectively manage Black Ash Creek as an 'urban stream' ecosystem.

The Nottawasaga Valley Conservation Authority (NCVA) also developed the 'Nottawasaga Valley Watershed Management Plan' in 1995; to deal with water management issues across the entire watershed. One of the recommendations in the 'Watershed Plan' was a directive to prepare of sub-watershed studies for the entire Blue Mountain Watershed, of which, Black Ash Creek is a part.

A completed section of Phase III of the Black Ash Creek Flood Control Project showing the seed and erosion control blankets on the side slopes.

The Project – Phase III

The project was awarded to Aecon Construction and Materials Limited of Brampton Ontario in November of 2003, for a tendered price of $2,724,450. The contract for Phase III included the realignment and channelization of 2.5 kilometres of Black Ash Creek from approximately 1.0 kilometres south of the Mountain Road Bridge to 1.1 kilometres south of the Sixth Street Bridge. The reconstruction of the Sixth Street Bridge, which included a two-lane detour, was also part of the project.
The work included:

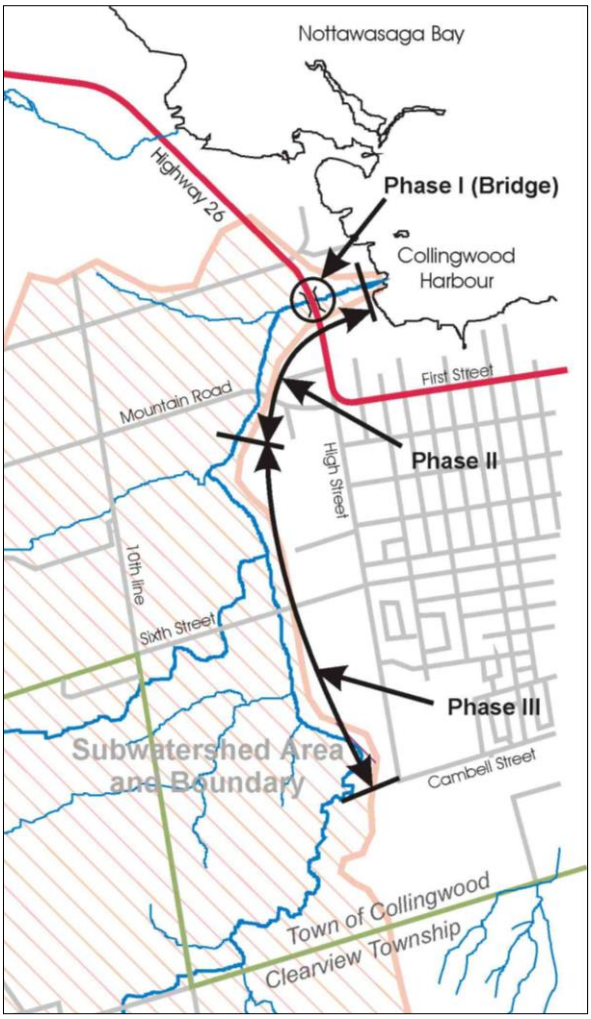
- Clearing and grubbing
- Earth and rock excavation
- Bridge reconstruction
- Fish habitat construction
- Earth Berm construction
- Topsoil, seed and mulch.

Realizing the potential impact on fish habitat, an Operational and Environmental Work Plan was prepared by the successful contractor and submitted to the Contract Administrator prior to the commencement of work. The Plan provided descriptions, working drawings or sketches, and schedules that described the sequence of work. At a minimum the Plan covered the following items:

- In-Stream Works
- Water Handling
- Sediment and Erosion Control
- Protection of Fish
- Working Easements
- Blasting Plan.

To mitigate any harmful alteration, disruption or destruction of fish habitat, the Plan contained the following general guidelines:

- No work permitted within the stream, water body or watercourse between March 15th to July 1st to protect local fish populations during the spawning and nursery periods
- Floodway construction to be completed in subsections not exceeding 300 metres in length starting at the downstream end and working upstream
- All in-stream work to be completed in the dry by dewatering the work area and diverting and/or pumping flows around cofferdams placed at the limits of the work area.



The map above shows the three phases of the Black Ash Creek Flood Control Project.

Initial clearing of the work site.

After the contract was awarded in November of 2003, initial clearing of the site began and was completed before the start of winter. In addition to the clearing operation, a 40-metre extension was added to the existing multi-plate steel culvert at the Sixth Street Bridge location. The culvert extension was added in preparation for the construction of a two-lane temporary detour in the following year and a new bridge.

Positioning the multi-plate steel culvert extension.

In the spring of 2004, major excavation began on the section of the creek bed that was to have a new alignment. Care was taken to ensure the existing creek was not disturbed while excavating.

Heavy equipment beginning the excavations for the channelization of the creek in the spring of 2004.

The existing creek bed (at the right) was protected while construction of the new alignment continued.

A silt cofferdam was constructed at the upstream limit of Phase II to prevent sediment migration.

Work proceeded through the spring and summer, with the contractor developing the site in 300-metre increments.

Rock excavation for the new channel alignment.

The section of Black Ash Creek contained within the Phase III limits has several feeder streams that outlet into the main channel. Each of these water sources had to be properly sculptured and aligned with the main channel to avoid potential erosion during spring run off or storm events. Side slope contouring and placement of rip rap, erosion blankets and rock revetments were employed at each inlet point.

Fish Habitat Features

A series of fish habitat features were constructed at specific points along the newly channellized creek bed. These features were designed to aid fish in their upstream travel during the annual spawning period. Earth and rock excavation from the site was used to construct the pools and riffles, fish ladder boulder clusters and live-rock revetments at the outside of bends of pools and rocky ramps. Imported river stone of 50 to 200-mm in size was placed in the constructed pools and riffles to a depth indicated on the drawings.

During construction of the main channel, some fish habitat was lost. As compensation, a new meandering stream was created by diverting the merging point of the Petun branch to run parallel with the main channel for approximately 500 metres before entering. The newly created stream bed, constructed on land owned by the NVCA, is designed for a 2-year event level. A weir was constructed at the original merging point of the Petun to divert excess flow, at times of high run off and storm events, into the main channel.

A weir was constructed at the original merging point of the Petun to divert flow into the new stream bed.

A completed section of the new Petun branch meandering stream bed, which parallels the main channel for 500 metres

The Petun branch out letting into the main channel

Sixth Street Bridge

After the two-lane temporary detour was built over the culvert extension the excavation for the bridge began. Prior to tendering Black Ash Creek Phase III, it was decided to change the cross section of the structure to allow for future widening of 6th Street from two lanes to four lanes based on future traffic volumes.

With the added width incorporated into the design, a temporary concrete wall was constructed on the downstream (north) side of the bridge giving a three-metre wide pathway for the Georgian Trail until the road is widened.

Since the bridge is an integral part of the Black Ash Creek Channelization project, particular care was given to the placement of rip rap scour protection at the inlet and outlet of the structure, the location of geotextile fabric under the rip rap and the placement and compaction of backfill in the excavated area.

The completed Sixth Street Bridge

Revegetation Plan

An extensive site plan was developed for the rehabilitation of the newly built floodway project limits following construction. The site rehabilitation plan included proposed erosion control measures and riparian and adjacent terrestrial revegetation strategies. The strategy was developed with the aim of promoting long - term channel stability, re-establishment and/or augmentation of existing riparian and adjacent terrestrial habitat and to contribute to fish habitat enhancement.

With floodway side slopes being approximately 10 to 12 metres in length, the revegetation efforts were concentrated within the bottom 2.0 to 2.5 metres of the banks and along top-of-bank areas. All disturbed or exposed and erodible soils within the floodway were covered with approximately 15cm of topsoil, seeded with a typical road side grass mixture and overlaid with a heavy-grade biodegradable geotextile.

Specifically, these areas included all floodway side slopes, floodway bottom adjacent to riffle areas and along the inside bends of the low-flow channel meander.

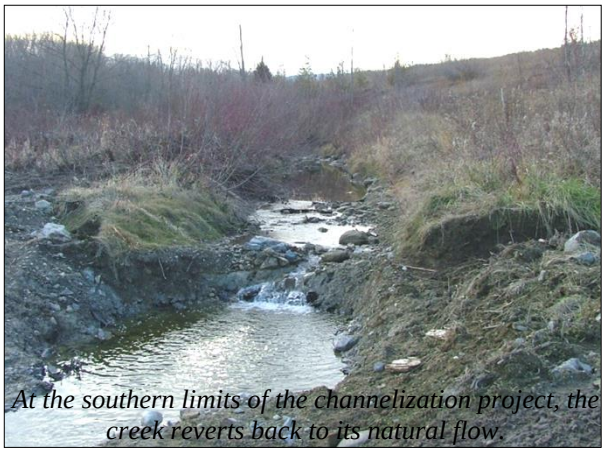
The revegetation plan required:

- 400 willow (bare root stock) whips
- 274 red ash seedlings
- 154 white cedar seedlings
- 90 trembling aspen seedlings
- 259 balsam poplar seedlings
- 50 spruce seedlings individuals.

The revegetation efforts will promote rapid reestablishment of native plant material that will function to replace existing vegetation within disturbed areas, and in many locations the revegetation efforts will greatly improve the quality and increase the density of the existing riparian and associated upland vegetation.

This photo shows one of the rock revetments, completed slopes and landscaping.

During the spring of 2005, the contractor returned to the site to inspect for and correct any erosion caused by snow-melt run off and storms and to assess the survival rate of all plants and seedlings.



At the southern limits of the channelization project, the creek reverts back to its natural flow.